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EXAMINER

LUKE, DANIEL M

ART UNIT	PAPER NUMBER
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2813

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/577,175	Applicant(s) NGUYEN ET AL.	
	Examiner DANIEL LUKE	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/26/2006 and 4/3/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the application filed 4/26/2006.

Currently, claims 1-33 are pending.

Information Disclosure Statement

The information disclosure statements (IDS) submitted on 4/26/2006 and 4/3/2007 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Claim Objections

Claim 1 is objected to because of the following informalities: It appears that the comma at the end of line 7 should be a semi-colon. Appropriate correction is required.

Claim 9 is objected to because of the following informalities: The area opened up by the defects is given as a percentage of the total area of the weakened area in the substrate. It is believed that this is meant to be a percentage of the total area of the substrate, as it is described in [0034] of the specification. Appropriate correction is required.

Claim 12 is objected to because of the following informalities: the word “apply” in line 1 should be “applying”. Appropriate correction is required.

Claim 22 is objected to because of the following informalities: The phrase “second species” is repeated. Appropriate correction is required.

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Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 29-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear whether the “heat treatment” referenced in claims 30-31 refers to the heat treatment defined in claim 29, or the heat treatment defined in claim 1, lines 8-10. It is believed that in claim 29, the phrase “wherein applying a pulse of energy” is meant to be “wherein applying a heat treatment”. This coincides with [0081] of the specification. Plus, it would not make sense for a “pulse” to last 2 to 5 hours, as claimed in claim 31. For these reasons, the claims will be examined under the assumption that the “pulse” of claim 29 is meant to be the “heat treatment”.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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Claims 1, 7-8, 17-19, 24-27 and 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Aspar et al. (US 2003/0077885).

Pertaining to claim 1, Aspar shows, while referencing FIG. 1A-D, a method of self-supported transfer of a thin film, the method comprising: preparing a source substrate (1); implanting at least a first species of ions or gas (3) at a first dose in the source substrate at a specified depth with respect to a face (2) of the source substrate, wherein the first species generates defects (4); applying a stiffener (7) in intimate contact with the source substrate; applying a heat treatment to the source substrate, at a specified temperature for a specified time, so as to create, substantially at the given depth, a buried weakened zone, without initiating a thermal splitting of the thin film ([0061], shown in FIG. 1B); and applying a pulse of energy to the source substrate so as to provoke a self-supported splitting of the thin film delimited between the face of the source substrate and the buried weakened zone, with respect to a remainder of the source substrate ([0055], shown in FIG. 1D).

Pertaining to claims 7 and 8, Aspar shows the pulse of energy may be applied without thermal means ([0055]). This implies the pulse may be applied at room temperature.

Pertaining to claims 17-19, Aspar shows the first species comprises H^+ ([0059]), and is implanted at a dose of $6 \times 10^{16} H^+/cm^2$.

Pertaining to claims 24-26, Aspar shows the source substrate comprises silicon ([0024], lines 4-10).

Pertaining to claims 24 and 27, Aspar shows the source substrate comprises germanium ([0024], lines 4-10).

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Pertaining to claims 24 and 32-33, Aspar shows the source substrate comprises LiNbO_3 ([0024], lines 4-10).

Claims 1, 12, 15-16, 20-21, 24 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Moriceau et al. (US 6,756,286)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

Pertaining to claim 1, Moriceau shows a method of self-supported transfer of a thin film, the method comprising: preparing a source substrate (column 11, lines 27-29); implanting at least a first species of ions or gas at a first dose in the source substrate at a specified depth with respect to a face of the source substrate, wherein the first species generates defects (column 11, lines 29-32); applying a stiffener in intimate contact with the source substrate (column 11, lines 55-59); applying a heat treatment to the source substrate, at a specified temperature for a specified time, so as to create, substantially at the given depth, a buried weakened zone, without initiating a thermal splitting of the thin film (column 11, lines 59-64); and applying a pulse of energy to the source substrate so as to provoke a self-supported splitting of the thin film delimited between the face of the source substrate and the buried weakened zone, with respect to a remainder of the source substrate (column 12, lines 8-28; column 4, lines 26-33).

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Pertaining to claim 12, Moriceau shows applying the stiffener comprises applying the stiffener at or before the moment of applying the heat treatment, and wherein the stiffener comprises a target substrate, the heat treatment contributing to improving the bonding energy between source substrate and the target substrate (column 11, line 55 – column 12, line 7).

Pertaining to claims 15-16, Moriceau shows the target substrates comprises monocrystalline silicon (column 12, lines 55-57).

Pertaining to claim 20, Moriceau shows the step of implanting a second species, at a second dose, wherein the second species occupies the defects generated by the first species (column 10, lines 9-33).

Pertaining to claim 21, Moriceau shows the first and second species are implanted at differing implant depths, and wherein the deeper implant is implanted first (column 8, line 52 and column 10, lines 11-13).

Pertaining to claims 24 and 28, Moriceau shows the source substrate is GaAs (column 4, lines 47-49).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aspar in view of Shaheen et al. (US 7,052,978).

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Aspar shows the method of claim 1, but fails to show the pulse is applied only to a portion of the buried weakened zone.

However, Shaheen teaches in column 12, lines 5-15, 33-34 and 38-43, as well as FIG. 12, that a laser is pulsed at the side of an implanted zone to propagate separation.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to pulse a laser only at the peripherals of the weakened zone of Aspar by pulsing a laser from the sides of the weakened zone, as taught by Shaheen, with the motivation that this technique improves surface roughness post-cleaving (column 13, lines 11-15).

Pertaining to claim 3, the laser is considered to be a thermal provision.

Pertaining to claim 4, Shaheen teaches applying energy comprises a brief movement of small amplitude (laser) applied by a tool (column 12, lines 5-45).

Pertaining to claim 5, Shaheen teaches externally applying a shock energy (laser) in a peripheral zone of the buried weakened zone (column 12, lines 5-45).

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aspar in view of Henley (US 6,146,979).

Aspar shows the method of claim 1, but fails to show that the pulse of energy is applied globally to the source substrate.

However, Henley teaches in the Abstract that a global heat treatment is used to separate a thin at an implantation site.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to apply the pulse of energy of Aspar globally, as taught by Henley, with the

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motivation that this process can be achieved by well known techniques such as RTA. This would decrease the complexity of the overall process, since processes such as RTA are well known.

Claims 9-11 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aspar.

Aspar differs from claims 9-11 in that Aspar does not show the specific percentage of area opened up, defect density, and defect size, respectively.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Aspar so that the defect size and density, as well as the percentage of area opened up, coincides with those ranges that are claimed, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Aspar differs from claims 29-31 in that Aspar does not show the specific claimed ranges of temperature and time for the heat treatment step.

However, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to perform the heat treatment at the claimed temperatures and times, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (1955).

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Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriceau in view of Sakaguchi et al. (US 5,966,620).

Moriceau shows the method of claim 12, but fails to show the target substrate comprises an amorphous material.

However, Sakaguchi teaches in column 9, line 13 that, for a technique similar to that of Moriceau, an amorphous material is used as the target substrate.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use an amorphous material, as taught by Sakaguchi, as the material of the target substrate of Moriceau, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416 (CCPA 1960).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriceau in view of Aspar et al. (US 6,103,597).

Moriceau shows the method of claim 12, but fails to show the target substrate comprises fused silica.

However, Aspar teaches in column 1, lines 15-16 that, for a technique similar to that of Moriceau, fused silica is used as the target substrate.

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to use fused silica, as taught by Aspar, as the material of the target substrate of Moriceau, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416 (CCPA 1960).

Claims 20 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aspar in view of Cayrefourcq et al. (US 2004/0171232).

Aspar shows the method of claim 1, but fails to show a second species is implanted to occupy the defects generated by the first species, wherein the second species is helium, and wherein the helium is implanted at a dose less than the first dose.

However, Cayrefourcq teaches in [0028] that, in a process for forming a weakened zone, a second species is implanted after implanting a first species so that the second species occupies defects created by the first species. The first species is hydrogen, while the second species is helium ([0030]). The second species is implanted at a dose that is less than the first dose ([0033]).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to implant a second species of helium, as taught by Cayrefourcq, after implanting the hydrogen of Aspar, with the motivation that this allows for the substrate to be split at a lower temperature than if only hydrogen were implanted ([0033]).

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL LUKE whose telephone number is (571)270-1569. The examiner can normally be reached on Monday through Friday 8:30 a.m. to 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Landau can be reached on (571) 272-1731. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. L./
Examiner, Art Unit 2813
6/15/2009

/Matthew C. Landau/
Supervisory Patent Examiner, Art Unit
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